

MARIA E. ORIVE* and JOHN F. BAUGHMAN, *Department of Biological Sciences, Stanford University, Stanford, California 94301.*

* Current address: Department of Zoology, University of California, Berkeley, California 94720.

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PERFORATED CUPOLA ORGANS ON LARVAE OF EUSELASIINAE (RIODINIDAE)

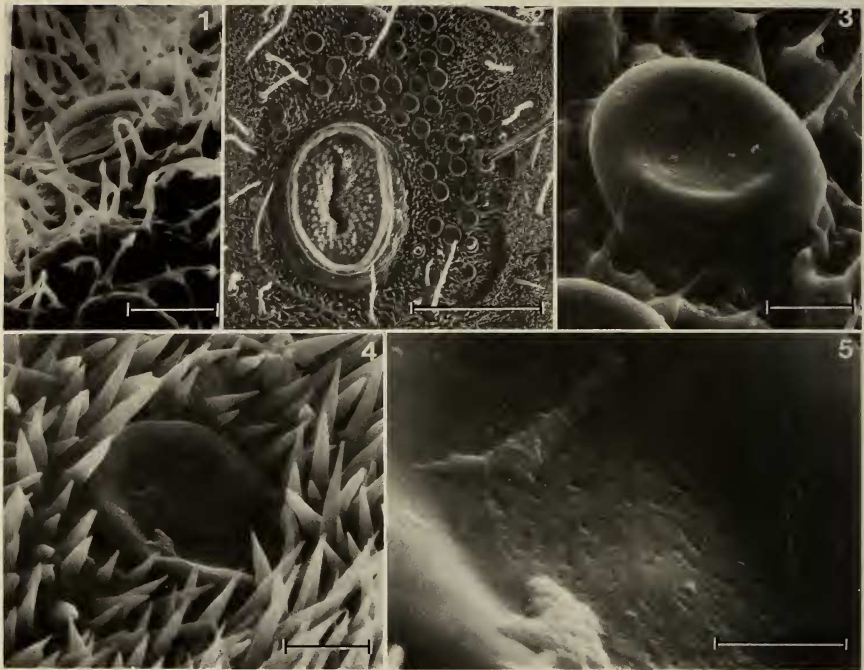
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Perforated cupola organs (PCO's) are minute, epidermal secretory organs, homologous to setae, found on larvae of many Lycaenidae (Malicky, H. 1970, *J. Lepid. Soc.* 24:190-202). They also occur on larvae of Riodinidae. These organs are known to secrete amino acids in some species (Pierce, N. E. 1983, Ph.D. Thesis, Harvard University, Cambridge, Massachusetts, 286 pp., Diss. Abs. Int. 44:1708B), and are thought to be involved in maintenance of ant associations in myrmecophilous species even though they are also found on myrmecophilous larvae (Malicky, above; Kitching, R. L. & B. Luke 1985, *J. Nat. Hist.* 19:259-276). These organs have been relatively well-studied in Lycaenidae (DeVries, P. J., D. J. Harvey & I. J. Kitching 1986, *J. Nat. Hist.* 20:621-633 and included references; Kitching, R. L. 1987, *J. Nat. Hist.* 21:535-544), but there is little information on their occurrence in Riodinidae (sometimes considered a subfamily of Lycaenidae). They have been illustrated using scanning electron microscopy in one myrmecophilous species of Old World Hemearinae, *Hamearis lucina* (L.) (Kitching & Luke, above), and one myrmecophilous species of New World Riodininae, *Pandemos palaeste* Hewitson (Harvey, D. J. & L. E. Gilbert, *J. Nat. Hist.* in press). They have not been illustrated, however, for larvae of a third subfamily, Euselasiinae, although their presence in this group has been alluded to (Harvey, D.J. unpubl., cited in DeVries et al., above). Larvae of the remaining subfamilies, the monotypic Styginae and Corrachiinae, are unknown (Harvey, D. J. 1987, pp. 446-447 in Stehr, F. (ed.), *Immature insects*, Vol. 1, Kendall/Hunt, Dubuque, Iowa, 754 pp.).

Euselasiinae consists of three genera: *Euselasia* with over 130 species, *Hades* with 2 species, and the monotypic *Methone* (Harvey, D. J. 1987, Ph.D. Thesis, University of Texas, Austin, Texas, 216 pp., Diss. Abs. Int. 49:625B). Distribution and morphology of PCO's on mature larvae of three euselasiines, *E. mystica* (Schaus), *E. aurantiaca* (Godman & Salvin) and *H. noctula* Westwood, are described here.

Larvae were examined with a Wild stereomicroscope. Material for scanning electron microscopy was coated with gold-palladium in a Hummer V sputter coater, and micrographs taken with an ISI Super IIIA.

All three species have the same distribution pattern of PCO's. Some are scattered along lateral and posterior margins of the prothoracic shield (Fig. 1). All remaining PCO's on larvae are restricted to clusters around abdominal (A) spiracles (Fig. 2). Long, tactile setae, present elsewhere on the larvae are absent from these clusters, though they may be immediately adjacent. The PCO's are set in fields of microtrichia (Figs. 2-4). The numbers of abdominal PCO's on larvae of the three species are as follows (A segment



FIGS. 1-5. Scanning electron micrographs of perforated cupola organs (PCO's) on larvae of Euselasiinae (Riodinidae). 1, *Euselasia mystica*, PCO on prothoracic shield (scale bar = 10 μm); 2, *Hades noctula*, cluster of PCO's around spiracle on A4, left side (scale bar = 200 μm); 3, *H. noctula*, individual PCO (scale bar = 10 μm); 4, *E. aurantiaca*, PCO in field of microtrichia, near spiracle on A4, left side (scale bar = 10 μm); 5, *E. aurantiaca*, sieve plate of PCO showing pores (scale bar = 4 μm).

number: number on right and left side; "?" denoting larva damaged and PCO's present but uncountable):

E. mystica: A1:15,17; A2:33,31; A3:24,27; A4:18,15; A5:14,10; A6:17,14; A7:22,26; A8:26,21.

E. mystica: A1:?,49; A2:55,52; A3:?,45; A4:?,?; A5:?,35; A6:39,?; A7:53,?; A8:70,?.

H. noctula: A1:36,38; A2:86,91; A3:47,56; A4:34,36; A5:33,28; A6:29,27; A7:42,51; A8:45,47.

In addition to identical placement of PCO's, all three species also show a similar pattern in relative numbers of PCO's on different segments: maximum numbers on the anterior segments are found on A2, usually followed by A3; and on the posterior segments, on A7 and A8.

Diameters of the PCO's average 21 μm for *E. mystica* (on prothoracic shield), 27 μm for *E. aurantiaca* (on A4), and 28 μm for *H. noctula* (on A4). Minute pores are visible on the central "sieve plate" of the PCO's (Figs. 1, 5). No pores are evident on sieve plates of *H. noctula*, which have minute crenulations (Fig. 3), of unknown function.

Larvae of *Euselasia* and *Hades* are myrmecophilous; ant mutualisms are restricted to the subfamily Riodininae (Harvey, above; Harvey & Gilbert, above).

PCO's of Riodininae differ from those on larvae of the myrmecophilous *H. lucina*, which lack pores, are not clustered, and are more sparse (Kitching & Luke, above). PCO's are also present on first instars of both myrmecophilous (*Eurybia*, *Calospila* among others)

and amyrmecophilous (*Apodemia*, *Calephelis* among others) riordinines, where they form a regular component of chaetotaxy (Harvey unpubl.). Despite broad taxonomic occurrence of PCO's, their function (if any) in euselasiines and other amyrmecophilous riordinids is obscure.

Pattern of PCO distribution in Euselasiinae examined in this study is consistent, and may be taxonomically significant. It resembles that described for the curetine lycaenid *Curetis regula* Evans (DeVries et al., above), where PCO's are also clustered near abdominal spiracles. However, *Curetis* differs in having PCO's near the prothoracic spiracle (rather than on the shield), and in their closer spacing (without intervening microtrichia). In addition, their form is more elevated, and waxy exudates are present on sieve plates. On the other hand, Euselasiinae differ from observed Riordininae, which usually have PCO's (when present) in several pairs of clusters per segment, or if single clusters are present (as in Euselasiinae), they are more dorsal on segments (Harvey & Gilbert, above; Harvey unpubl.). Restriction of PCO's to clusters around spiracles and prothoracic shield may be the primitive configuration in Riordinidae, perhaps also in Lycaenidae. In light of this possibility, description of PCO's from additional members of Hamearinae, from *Styx infernalis* Staudinger and *Corrachia leucoplaga* Schaus, and from the lycaenid subfamilies Lipteninae and Poritiinae, would be of interest.

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DONALD J. HARVEY, *Department of Zoology, University of Texas, Austin, Texas 78712.*
Present address: Department of Entomology, National Museum of Natural History,
NHB Stop 127, Smithsonian Institution, Washington, D.C. 20560.

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